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September 27, 1995

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: *Ex Parte* Meeting-CC Docket No. 94-54

Dear: Mr. Caton:

On behalf of Comcast Corporation and pursuant to Section 1.1206(a) of the Commission's Rules, this letter will constitute notice that on September 27, 1995, Leonard J. Kennedy, Esq. and Laura H. Phillips, Esq. of Dow, Lohnes & Albertson met with David Sieradzki, Esq., Dr. Gregory Rosston, Dr. Jay M. Atkinson, Carla Frank, Esq., Mark Nadel, Esq., Mr. William Sharkey, Barbara S. Esbin, Esq., of the Commission's staff and Jeffrey Smith, Esq., Gregory Butz and Dr. Gerald W. Brock to discuss outstanding issues in the Commission's Commercial Mobile Radio Service Interconnection and Resale rulemaking proceeding. Comcast's views on the substantive issues discussed are identified in comments filed in the above-referenced docket on August 30, 1994.

In addition, the *ex parte* meeting addressed economic aspects of interconnection compensation policies and related issues. Dr. Brock's analysis of mutual compensation interconnection policies was also discussed and is attached.

An original and one copy of this letter has been submitted to the Secretary. Should any questions arise in connection with this notification, please do not hesitate to contact the undersigned.

Respectfully submitted,

Leonard J. Kennedy
Attorney for Comcast, Inc.

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September 27, 1995

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Commission policy recognized CMRS providers as co-carriers with LECs. The Commission, therefore, adopted the principle of mutual compensation.

LECs have not implemented meaningful mutual compensation in cellular and without further direction from the Commission are not likely to adopt it for PCS.

Therefore, the Commission must adopt a specific, pro-competitive structural solution.

Bill and keep is the best alternative for a number of policy, business and economic reasons.

Bill and Keep

- will fairly compensate LECs and CMRS providers;
- is economically efficient (LEC incremental cost of terminating traffic is de minimis);
- is administratively simple (no new billing, or accounting systems are required);
- can be implemented without delay (no need for cost studies);
- will promote competition and a network of networks by promoting interconnection; and
- will limit the extension of LEC monopoly power into wireless markets.

ISSUE UPDATE: INTERCONNECTION AND COMPENSATION

Prepared for NARUC's Summer Meeting
July 1995

by
Teleport Communications Group (TCG)

This issue update is intended to be a companion to "The Economics of Interconnection", three papers on key aspects of the interconnection compensation issue authored by Gerald W. Brock[1] and published as a collection by TCG in April 1995. For the benefit of those who have not had the opportunity to read these papers, they are attached.

In the three papers, Mr. Brock explains how reciprocal compensation arrangements that are administratively simple, economically correct and consistent with maximum network efficiency would arise in a competitive marketplace. He also explains why regulators must guide a previously monopolized market in transition to competition towards an economically correct interconnection compensation system and why such regulation must limit compensation to no more than the incremental cost of the peak period capacity required to terminate the traffic. Because such an incremental cost is so trivial, he also suggests why a zero-priced interconnection ("sender keep all" or "bill and keep"), such as has been agreed to by commercial service providers on the INTERNET, meets these economic requirements.

INTRODUCTION AND SUMMARY

Competing local exchange carrier (LEC) networks must be seamlessly interconnected to avoid a repeat of the situation, which existed at the turn of the century, when local exchange service was competitive and unregulated but consumers had to bear the expense and inconvenience of having to subscribe to two or more telephone systems that did not connect, in order to reach all the parties they wanted to talk to.

"Seamless interconnection" means more than simply physically interconnecting competing local exchange carriers' networks. It also means that the competing local exchange carriers must establish the administrative and financial arrangements necessitated by the exchange of calls between their competing networks. And the single most critical issue is the establishment of a system by which each LEC will be compensated

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[1] Gerald W. Brock is a former Chief of the FCC's Common Carrier Bureau. He is currently professor of telecommunications and Director, Graduate Telecommunications Program at The George Washington University in Washington, D.C.

for terminating local telephone calls originated on another, competing LEC's network: one compensation system will promote vigorous local exchange competition that strongly benefits all consumers; another system will stifle competition or, perhaps worse, create only the illusion of competition that results in a virtually deregulated monopoly.

If the traditional, mature LECs and the emerging, start-up competitive LECs cannot negotiate a mutually acceptable compensation system, as seems likely, regulators will have to decide the issue and do so quickly. Their selection of one system or the other will largely determine whether effective local exchange competition will be economically viable, or not.

If local exchange competition is economically viable, then competition can safely be substituted for regulation and substantial changes in the regulation of the traditional local telephone industry can and should be made. But if the interconnection compensation system does not allow for economically viable local exchange competition, then the result, eventually, will be greater regulation of the telephone monopolies and the loss to this country of the economic and social benefits of a vigorously competitive market.

Which system should be adopted? Which system will be adopted?

INTERCONNECTION COMPENSATION IS A CRITICAL BUT TEMPORARY ISSUE CAUSED BY UNBALANCED TRAFFIC AND THE LACK OF NUMBER PORTABILITY

The transitional problem facing local exchange carriers and their regulators is that, in the near and medium term, the traffic exchange between immature, start-up Competitive LECs (CompLECs) such as TCG and the mature, Traditional LECs (TLECs) that have market power and all of the customers will be substantially imbalanced. In the period of imbalance, the CompLECs will terminate substantially more traffic on the TLECs' networks than the TLECs will terminate on the CompLECs' networks.

To attain a reasonably balanced exchange of traffic with a TLEC, a CompLEC must serve a customer mix that is similar to the TLEC's. This means, for example, that CompLECs would have to serve a full range of customers with predominantly outbound

usage, as well as a full range of customers with predominantly inbound usage. But without effective, efficient number portability, CompLEC's will be discouraged from seeking "inbound customers" (compounding the traffic imbalance problem) and some consumers will be discouraged from subscribing to the CompLECs' outbound service.

Regulators must recognize that Service Provider Number Portability ("SPNP") is a prerequisite to the natural "balanced traffic" that characterizes mature interconnection relationships and should therefore insist that effective, database-driven Service Provider Number Portability be in place before they give serious consideration to permitting the usage-sensitive compensation systems advocated by some TLECs.

Time is required to allow CompLECs to mature in the marketplace. And time is also required to develop a database-driven SPNP system needed to allow consumers with substantial inbound traffic to be served efficiently by CompLECs.

In summary, as the traffic between a CompLEC and TLEC becomes reasonably balanced as the result of the natural maturation of the CompLEC and the availability of SPNP, interconnection compensation will become a "non-issue" because any charges that are assessed reciprocally will cancel out. But will CompLECs have a reasonable opportunity to mature? The answer is, only if the substantial short-term reciprocal compensation problem is resolved immediately.

CONFLICTING APPROACHES TO INTERCONNECTION COMPENSATION

Mature traditional local exchange carriers and the emerging, start-up competitive LECs are proposing mutually exclusive compensation models. If the carriers cannot come to negotiated agreements, regulators will have to choose between them. The alternatives are:

- ***USAGE-SENSITIVE***

  TLECs are proposing usage-sensitive schemes (i.e., minutes-of-use), often based on the existing "switched access charges" imposed as a matter of public policy on the

termination of interexchange carriers' long distance traffic. Since the interexchange access charges are by design "uneconomic", it follows logically that a usage-sensitive system would tend to maintain the *status quo*, advantaging the incumbent dominant LECs and disadvantaging the new entrants.

- ***USAGE-INSENSITIVE***

  TCG and other actual and potential CompLECs are proposing usage-insensitive compensation systems, either "bill and keep"[2] or flat-rated capacity charges[3] or some combination of the two. (A "bill and keep" arrangement can be thought of as a "zero priced" flat-rate capacity charge.) Because any costs incurred by TLECs to terminate CompLECs' traffic are both trivial and not related to usage, a usage-insensitive compensation system would be "economic" and encourage a more competitive local telecommunications marketplace.

It is obvious that CompLECs will not start out with the extensive networks and customer base of incumbent LECs. It will take a considerable period of time for CompLECs to develop their networks and build their customer base, particularly in the absence of Service Provider Number Portability. To establish the effective, sustainable competition that would justify and perhaps require substantial changes in the regulation of TLECs, regulators must ensure that interconnection compensation systems favor "**competition**" (not a particular competitor) and that they are based on sound economic and policy principles.

Establishing an appropriate mechanism and level of compensation between competing local carriers is critical for the development of competition. Thus, regulators should evaluate each of the basic proposals on the basis of whether it satisfies the following criteria:

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[2] "Bill and keep" (or "sender keep all") refers to a system whereby each carrier reciprocally terminates the other carriers' traffic for no explicit charge so that the originating carrier "bills" the originating subscriber and "keeps" all of the billed revenue.

[3] In a "capacity charge" compensation system, the carrier originating a call terminates it through a fixed amount of switching capacity (i.e., a DS1 switch port) at fixed monthly charge.

- creating an environment that encourages viable local competition;

- encouraging innovative retail pricing;

- favoring administrative simplicity and low administrative cost; and

- encouraging investment in, and the development of, a rugged, disaster-resistant local telecommunications infrastructure.

As explained more fully below, CompLECs' various usage-insensitive proposals generally satisfy all these criteria. By contrast, the TLECs' usage-sensitive proposals would thwart effective, sustainable competition because they are inefficient, administratively burdensome, and prevent economically viable competition.

USAGE-SENSITIVE INTERCONNECTION RATES CAN'T WORK IN A COMPETITIVE LOCAL MARKET

Usage-sensitive interconnection rates will not encourage the sort of vigorous competitive market that benefits consumers. Rather, at best (or at worst, depending on one's viewpoint), they would allow the TLECs to create just enough of an **illusion** of competition to justify their demand for radical changes in the regulatory system. That is because usage-sensitive interconnection would set the CompLEC's price floor, constrain the new entrant's ability to devise innovative pricing plans, and transfer all the economic benefit of any CompLEC marketing success to the TLEC. Regulators should not settle for such an illusion of competition; they must encourage the reality of vigorous, sustainable competition.

To illustrate the issue, consider the case of Oregon. Local exchange telephone service in Oregon is provided under almost every type of rate plan used elsewhere in the country: both usage-sensitive and flat-rate/unlimited use retail rates are available with optional volume discounts to both business and residential consumers. And US WEST's proposed interconnection compensation for Oregon is typical of TLEC proposals for a usage-

sensitive call completion rates. Therefore, while the circumstances in each State are unique and must be taken into account, Oregon provides an excellent framework for examining the full range of interconnection compensation issues. As the following analysis of US WEST's compensation interconnection proposal demonstrates, it, like other such usage-sensitive systems, is uneconomic, unworkable and anticompetitive.

Under its proposal, US WEST would impose a charge of 2.0 cents/min. for terminating local exchange calls originated by CompLECs. This 2.0 cents/min. rate is uneconomic and unreasonable because it is probably at least 10 times higher than the incremental cost.[4] Such high usage-sensitive rates make it impossible for a CompLEC to economically address any market segment, as the following examples illustrate:

- **Competing for Small and Medium Business Users**

  Small businesses in Portland have two options: they can purchase a measured rate complex business line for $18.00 per month plus 3 cents/min. for local exchange calls, or they can purchase a line with unlimited local calling for $34.77 per month.

  It has been estimated that about 10 percent of Portland's business lines are measured rate. Upon first impression, it appears that CompLECs would have a 1 cent/per min. gross margin when competing for measured rate service users at the proposed 2.0 cent/min. interconnection rate. But this margin is illusory: most of the businesses that choose measured service use discount calling plans based on the number of minutes of use per month on each line. The plans for 6, 9, 12, and 18 hours of usage drop the average marginal rate of a local call below the proposed interconnection rate (to 1.47 cents/min. for 6 hours; 1.65 cents/min. for 18 hours).

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[4] See, Brock, "Incremental Cost of Local Usage," where it is noted that studies done by or supported by TLECs indicate that 0.2 cents/min. is a reasonable estimate of a TLEC's average incremental cost of terminating a CompLEC's traffic. It is also noted that the cost is determined by peak period capacity and therefore the true cost is considerably higher than the 0.2 cents/min. average during the peak period and is zero during the non-peak period.

It has been estimated that more than 90% of the business lines in Portland are purchased on a flat-rate basis with unlimited local calling and it is likely that most of these lines are used by "medium" sized businesses. To address this substantial market, CompLECs will need to offer a flat rate/unlimited use option.

The $16.77 difference between the measured rate line ($18.00) and the flat rate service ($34.77) is the price to purchase unlimited local usage. Table 1, below, compares the effective calling rate per minute for business customers purchasing the flat rate/unlimited use service with the proposed 2.0 cents/min. interconnection charge. **In every instance, CompLECs are left with negative operating margins.** In other words, under the TLEC's proposal, even before the CompLECs address their own costs of providing service, they would lose money if they tried to match the TLEC's effective calling rate.

TABLE 1 **(COMPETING FOR MEDIUM BUSINESS USERS WITH FLAT RATE, UNLIMITED USE SERVICE)**

Local Calling Mins./Month	Effective Calling Rate per Minute	Proposed Interconnect Rate	CompLEC's Margin
900	1.86	2.0	(0.14)
1000	1.68	2.0	(0.33)
1100	1.52	2.0	(0.48)
1200	1.40	2.0	(0.60)

All per minute values expressed in cents.
Effective Rate per Minute = $16.77 / Local Minutes per Month
Operating Margin = Effective Calling Rate - USWC Proposed Inter-carrier Compensation rate.

- **Competing for Large Business Users**

In Oregon, low cost local calling is available for large business users (those with digital PBXs) through the TLEC's Digital Switched Services ("DSS"). The following chart shows the market realities faced by prospective CompLECs in that market, which is initial "core" market for CompLECs:

DS1 Charge:	**$150.00**
24 Outbound	
Advanced Trunks ($23 each):	**$552.00**
EUCL Charge ($6 each):	**$144.00**
Total Monthly Charges:	**$846.00**

A large business customer using these services would typically generate a total usage of about 160,000 minutes per month per DS1. This would yield an effective local calling rate of 0.529 cents/min ($846.00/160,000 mins), meaning that a CompLEC would lose 1.471 cents/min. (and probably more since the CompLEC may have to offer lower retail rates to attract the large user in the first place).

By making it impossible for CompLECs to compete for the large business users' traffic, the usage-sensitive interconnection scheme makes it impossible for CompLECs to achieve the capacity utilization factors needed for the CompLEC to be an active and effective competitor in the residential and smaller business markets.

- **Competing for Residential Consumers**

Residential users in the Portland area can purchase a measured service phone line from the TLEC at a monthly rate of $6.37. They can also purchase 3- and 6-hour usage discount plans whose effective retail prices range from 1.27 to 1.33 cents/min., well below the proposed CompLEC call completion rate of 2.0 cents/min.

It has been estimated that about 90% of residential customers in Portland purchase flat-rate/unlimited use service, which they can obtain for $12.80 per month. Thus, the customer can purchase unlimited local usage for $6.43 per month -- the difference between the flat rate service ($12.80) and the measured service phone line rate ($6.37). Table 2, below, which assumes an average call duration of 5 minutes, provides some frame of reference:

TABLE 2 (COMPETING FOR RESIDENTIAL USERS WITH FLAT RATE/ UNLIMITED USE SERVICE)

Local Calls Per Day	Local Minutes Per Month	Retail Rev. Per Min.	Proposed Interconnect Rate	CompLEC's Margin Per Min.
3	450	1.43	2.0	(0.57)
4	600	1.07	2.0	(0.93)
5	750	0.86	2.0	(1.14)
6	900	0.71	2.0	(1.29)

Revenues, rate, and margin expressed in cents.
Local Minutes per Month = Local Calls per Day x 30 x 5
Retail Revenue per Minute = $6.43 / Local Minutes per Month
Margin = Proposed TLEC Termination Rate - Retail Revenue per Minute

As Table 2 demonstrates, if CompLECs in Oregon had to pay 2.0 cents/min. to TLECs to terminate a local call, the CompLECs would not be able to compete for residential callers who make more than 2 calls per day.

In a jurisdiction with **mandatory** measured use for ALL classes of users, it might be possible to devise usage-sensitive interconnection compensation rates that provide for some "positive" margin between the TLEC's effective retail rates and the interconnection rates paid by the CompLECs. But this would defeat a major consumer benefit of local exchange competition: because such interconnection rates would parallel the TLEC's retail volume and time-of-day/day-of-week discounts, they would force CompLECs to become clones, not competitors.[5]

Usage-sensitive interconnection rates are even less workable in jurisdictions with mandatory or optional "flat-rate/unlimited use" local calling. The fundamental mis-match between a usage-sensitive wholesale rate and retail flat-rates would strongly discourage CompLECs from serving high volume customers, particularly INTERNET users and information services subscribers.

USAGE-INSENSITIVE INTERCONNECTION RATES WILL WORK IN AND ENCOURAGE A COMPETITIVE LOCAL EXCHANGE MARKET

In contrast to the TLECs' usage-sensitive proposals, the usage-insensitive arrangements advocated by TCG and other CompLECs are

[5] Complex volume and time-of-day/day-of-week discounts in the interconnection rates would impose substantial measurement, billing and reconciliation problems and costs on both carriers.

likely to establish the basis for a competitive local telecommunications market that strongly benefits all consumers.

- ***Usage-insensitive compensation is fair and appropriate where costs vary based on capacity, not utilization.***

  All carriers make rather "lumpy" investments in switching and interoffice trunking capacity-based on peak busy hour forecasts. As Gerald Brock's "Economics of Interconnection" points out, the bulk of the TLECs' interconnection-related costs are incurred when termination capacity is created, based on peak load demands. And these investments in peak period termination capacity will be made regardless of whether the traffic is originated by a TLEC or a CompLEC and regardless of any forecast off-peak usage levels. Consequently, there are few, if any, incremental facility costs associated with terminating a CompLEC's peak period traffic[6] and there are virtually no variable costs associated with off-peak usage.

  The usage-sensitive compensation schemes proposed by TLECs so substantially overstate the cost of completing calls at most times of the day that they could not satisfy the "just and reasonable" test of general public utility law and policy.

  By the same token, a usage-insensitive compensation system, which fully compensates a carrier for all of the net incremental costs incurred in making peak period capacity available, clearly would be just, reasonable and, because it encourages effective -- not illusory -- competition, in the consuming public's interest.

- ***Usage-insensitive compensation allows CompLECs to offer aggressive and innovative retail pricing to consumers***

  "Bill and keep" or, to a lesser extent, capacity charges based strictly on incremental costs, afford CompLECs the

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[6] Vigorous price, promotional and quality competition between CompLECs and TLECs could stimulate additional total traffic volume and require some additional capacity. However, CompLECs will be providing much of the additional total capacity required by the total "network of networks" so that TLECs will also enjoy some avoided costs.

freedom to introduce the innovative pricing plans that are a hallmark of a competitive market.

Each carrier in the competitive market must be able to independently develop its retail price strategy, including time-of-day and volume discounts in a measured use environment or different plans in a flat-rate retail environment. Such innovation and competitiveness is not possible in an environment where the dominant carrier is allowed to impose per-minute interconnection charges that set an effective price floor for "competitors".

With usage-insensitive interconnection, it will be more difficult for TLECs to control CompLECs' rate levels or to force CompLECs to clone the traditional rate structures. Rather, CompLECs would have the freedom to price their services in a manner that responds to consumers' preferences and, thereby, to maximize their volume and revenue.

- ***Usage-insensitive interconnections are much simpler and less expensive than usage-sensitive arrangements.***

Usage-sensitive interconnection charges will require complex and costly measuring, recording, and billing capabilities that few local exchange carriers possess today. Indeed, there is a question as to whether some TLECs currently even have the technical capability to measure terminating local exchange traffic. (Terminating local exchange traffic coming from a CompLEC will not trigger the TLEC's measuring system that is used to record terminating traffic.)

In any case, it is likely that the costs of measuring, billing, collecting and reconciling interconnection compensation are so high relative to the cost of providing the underlying service, that -- absent an anticompetitive intent -- it makes good business sense to avoid these costs altogether. The "bill and keep" arrangements proposed by TCG and other CompLECs does just that.

In fact, testimony filed in a pending interconnection compensation case in Washington State notes that US WEST's own cost studies demonstrate that the costs of measuring, billing and collecting inter-carrier compensation exceed the

costs of terminating local calls at the end office. Although this cost may differ somewhat in other States, it demonstrates, at the very least, that billing and administrative costs are significant relative to the incremental costs of the switching itself.

And if "bill and keep" is not adopted for some reason, flat-rate capacity charges are almost as easy and inexpensive because they entail only one monthly measurement of traffic (to allocate expenses on two-way interconnection trunks) and counting a few physically identifiable, permanent facilities (i.e., switch ports). Moreover, capacity charges represent a good transitional vehicle to a "bill and keep" arrangement that would naturally occur when traffic between carriers is balanced.

In summary, for the reasons outlined above, local exchange carriers should compensate each other by terminating each others' traffic on a usage-insensitive basis.

COMPENSATION SYSTEMS CAN MAXIMIZE DISASTER AVOIDANCE AND ENCOURAGE INFRASTRUCTURE INVESTMENT

Public policy should encourage the evolution of a public switched telecommunications network which is as resistant as reasonably possible to catastrophic service outages caused by natural and man-made disasters and accidents. Such disaster resistance is produced by avoiding "single points of failure" and maximizing switch and transmission facility diversity.

In a usage-sensitive interconnection scheme, it is likely that the price of interconnection at a TLEC's tandem switch would be higher than the price of interconnection at the end office. (Such two-tier pricing is used for interexchange access services.) If the tandem-end office differential is large enough, CompLECs would have an incentive to interconnect more at the end office and less at the tandem. From a public policy perspective, this is probably a desirable result since it would increase the physical diversity and therefore the disaster resistance of the public "network of networks": a catastrophic outage at the TLEC tandem would have less impact on the overall network and CompLECs would deploy diverse transmission facilities that could provide

route redundancy on inter-switch trunks for both CompLEC and TLEC.

However, a usage-insensitive system -- whether "bill and keep" or "capacity charges"-- which applies equally at both the end office and the tandem would sacrifice this public benefit: it could encourage CompLECs to over-rely on the tandem interconnection and it would not encourage CompLECs to build diverse facilities to the proximity of more TLEC end offices, thereby minimizing CompLECs' contribution to the overall telecommunications infrastructure.

The best way to encourage a more diverse and disaster-resistant "network of networks" is not to impose a usage-sensitive interconnection compensation system. Rather, the solution is to graft the one redeeming feature of the usage-sensitive system onto the otherwise superior usage-insensitive system. A usage-insensitive system can be adapted to provide CompLECs with an incentive to make greater use of "end office" interconnections with the TLEC by, for example:

- Having "bill and keep" at the end office and a flat rate capacity charge at the tandem. (The tandem capacity charge could be based upon the per minute cost of tandem switching and average tandem-end office transport and a typical utilization factor appropriate to DS1 inter-switch trunks. By way of example, in the pending Washington interconnection compensation case, based on US WEST's TSLRIC studies, this formula would yield a monthly flat-rate capacity charge for a tandem DS1 port of about $130 using a utilization factor of 216,000 minutes per month.)

- Transitioning from mandated "bill and keep" to a cost-based interconnection (i.e., flat-rate capacity charges) at the tandem some number of years before such a transition occurs at the end office. (This transition period could begin when

database-driven Service Provider Number Portability becomes available so that CompLECs have a "reasonable" period in which to achieve the actual traffic balance that "bill and keep" emulates but cost-based interconnection would apply if the CompLEC was unable to achieve balanced traffic because of it own marketing decisions or other factors.)

The compensation system applied to the exchange of traffic between TLEC and CompLEC is not the only factor that will encourage or discourage the evolution of a disaster-resistant public switched network. The cost of the interconnection facilities -- the fiber optic cables or microwave links -- between the CompLEC switching center and the TLEC switching center will also play a very significant role in determining whether the public network will be vulnerable to disasters or not.

The cost of "collocation" arrangements (either physical or virtual) developed for special access and private line services make such arrangements totally inappropriate as the sole means of establishing the physical interconnection for local exchange service (although existing special access collocation arrangements should be used for local exchange service at the option of the collocating carrier). The high cost of collocation would strongly discourage end office interconnection and would therefore encourage a disaster-vulnerable network. Instead of collocation, CompLECs and TLECs should interconnect physically for local exchange service in the same way that adjacent TLECs currently do: over a shared, jointly constructed and paid for "meet point" facility with each carrier being responsible for the electronics at its end of the transmission facility.

With a "two-tier" interconnection compensation system that encourages end office interconnection and limiting the length a joint interconnection facility to a few miles, CompLECs would tend to extend their networks to the vicinity of TLEC end offices. This would establish the diverse transmission facilities that add disaster resistance to the overall public network.

"BILL AND KEEP" OR "CAPACITY CHARGE"?

As noted briefly at the beginning of this paper, TCG and other actual or potential CompLECs have proposed two types of usage-insensitive reciprocal compensation systems:

- **"Bill and Keep"**, in which each LEC terminates the other's traffic for no explicit monetary fee in return for the reciprocal right to terminate its traffic also for no explicit payment.

- **Capacity Charges**, based strictly on the incremental cost of providing the units of peak period capacity made available to the interconnecting LEC.

A "bill and keep" compensation arrangement clearly has many benefits:

- **First**, it implicitly nets the trivial incremental costs associated with the carriage of the traffic during the period of substantial traffic imbalance against the relatively substantial billing and administrative costs which won't be needed once balance is achieved;

- **Second**, it is the simplest and least expensive system administratively, as no recording, or creation and payment of bills is required. (This has the additional benefit of eliminating conflicts between TLECs and CompLECs that would require arbitration by regulators.);

- **Third**, it allows CompLECs the greatest freedom and flexibility in designing innovative and competitive retail pricing plans so as to maximize the benefit to consumers; and,

- **Fourth**, it anticipates the development of the "balanced traffic" which is likely to occur if CompLECs have a reasonable opportunity to mature.

A flat-rate capacity charge (based strictly on the incremental cost of the peak period capacity) shares many of the fundamental advantages of a "bill and keep" arrangement; administrative costs will be a little higher, TLECs won't be able to complain about

not being compensated in cash and all the consumer benefits are preserved.

CONCLUSION

Regulators are being presented with a clear choice that will have profound consequences:

- They could choose the volume-insensitive reciprocal interconnection compensation systems being proposed by TCG and other prospective competitive local exchange companies to solve the **transitional problem** caused by relatively **temporary** traffic imbalances. If they do, it will dramatically increase the likelihood that vigorous local exchange competition will be economically viable and sustainable, with all the beneficial economic and social consequences that implies.

- They could choose the volume-sensitive reciprocal compensation scheme being proposed by the traditional local telephone companies to preserve the **status quo**, particularly their market dominance, **permanently**. If they do, it will dramatically increase the likelihood that local telecommunications services will continue to be the weak link in a state's "information infrastructure", with all the adverse economic and social consequences that implies.

The choice seems obvious: regulators must embrace volume-insensitive compensation arrangements, such as "bill and keep," to give effective local exchange competition a reasonable chance.

INCREMENTAL COST OF LOCAL USAGE

Gerald W. Brock
March 16, 1995
Prepared for Cox Enterprises

Summary

A reasonable estimate of the average incremental cost of local usage (and therefore the cost of terminating traffic received from a competitor) using digital technology is 0.2 cents per minute. That estimate is based on studies done by or supported by telephone companies. The cost is determined by peak period capacity and therefore the true cost is considerably higher than the 0.2 cents per minute average during the peak period and is zero during the non-peak period.

I. Introduction

In a separate paper prepared for Comcast, I have argued that the theoretically correct interconnection charge is cost based mutual compensation. However, cost can have many different meanings and in a regulatory context, cost based requirements can lead to interminable regulatory proceedings and disputes. Policy makers have consequently frequently sought structural methods of solving problems that do not require detailed oversight of cost rules.

One proposed structural rule is mutual compensation without oversight of actual rates, but as shown in the Comcast paper that approach is inadequate to limit the exercise of monopoly power. An alternative approach that dispenses with direct control of cost is the policy of "sender keep all" or "bill and keep" in which each party agrees to terminate traffic for the other without payment for terminating service. That is equivalent to mutual compensation with a zero price for compensation. It will be economically efficient if either of two conditions are met: (1) Traffic is approximately balanced in each direction; (2) The actual costs are very low so that there is little difference between a cost based rate and a zero rate.

Existing publicly available studies suggest that the incremental cost of local usage (and therefore the cost of terminating traffic from a competitor) is on average approximately 0.2 cents/minute. The actual cost is considerably higher during the peak period and zero during the off peak period. Thus it would not be efficient or desirable to charge at 0.2 cents/minute on a usage basis. However, the very low average number compared to the price currently charged by local exchange companies suggests that far greater distortions are likely from mutual compensation without control of rates than from sender keep all approaches.

There are two basic methods for estimating cost:

(1) engineering studies of the forward looking cost to supply a particular service;

(2) econometric (statistical) studies of the relationship between observed cost and observed outputs.

Both engineering and econometric studies provide useful information on cost. The engineering study allows one to focus on best practice technology and compute the incremental cost of adding capacity to provide a particular function. Econometric studies provide a reality check by using observed output and cost data rather than projections of expected cost. However, econometric studies may produce less precise estimates of the incremental cost of a particular service than engineering studies because they are measuring the correlation between variations in the total cost of different telephone companies and variations in the quantities of particular services provided by those companies. The cost data include costs for different embedded technologies used by the companies and are not precise enough to provide detailed estimates of the incremental costs of particular services with particular types of technology.

II. Engineering Estimate

The most comprehensive public engineering study of incremental cost was done by the Incremental Cost Task Force with members from GTE, Pacific Bell, the California Public

Utilities Commission, and the RAND Corporation.[1] The Task Force had access to data for telephone companies in California and performed a detailed engineering cost study for various output measures of local telephone service. Individual components were priced based on 1988 prices and costs were computed for switch investment, switch maintenance, interoffice transport, and call attempt costs. All costs were computed for calls during the busiest hour of the year because the investment and associated expenses are related entirely to capacity cost. The Task Force computed the following usage costs for each hundred call seconds (CCS) during the busiest hour of the year for "average" and "larger urban" exchanges:

switch investment	$ 5.00 - $ 10.00	per year
switch maintenance	.20 - .50	per year
interoffice calling	.50 - .60	per year
Total	$ 6.00 - $ 11.00	per year

In addition, the task force computed a cost of $ .30 to $.90 per year for each call attempt during the busiest hour of the year and estimated approximately 1.25 busy hour attempts per busy hour CCS.[2]

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1 Bridger M. Mitchell, Incremental Costs of Telephone Access and Local Use, (Santa Monica, CA: The Rand Corporation, 1990); reprinted in William Pollard, ed., Marginal Cost Techniques for Telephone Services: Symposium Proceedings (Columbus, Ohio: National Regulatory Research Institute, 1991) (NRRI 91-6).

2 Ibid., p. 249, 250.

There are 8766 hours per year and the ratio of the peak usage rate to the average usage rate is approximately 3.[3] That implies that one busy hour CCS is approximately equal to 2922 CCS per year (8766/3). Because one CCS is equal to 1.67 minutes, costs per busy hour CCS can be converted into average costs per minute by dividing by 4880 (2922 total year CCS times 1.67 minutes/CCS). Thus the $6.00 - $11.00 cost per year per CCS during the busiest hour of the year translates into $.0012 - $.0023 per minute. The busy hour attempt cost adds $.375 - $ 1.125 per busy hour CCS (1.25 busy hour attempts per buy hour CCS and $.30 to $.90 annual cost per busy hour attempt), raising the total cost, including busy hour attempts, to $6.375 - $12.125, and the per minute cost to $.0013 - $.0025. Taking the middle of the estimated range gives a cost of $.0019 per minute, or approximately 0.2 cents/minute.

Because the cost is determined by the the peak capacity, the actual cost per minute is much higher at the peak and is zero at the off-peak. If, for example, one assumes that an equal size peak occurs for one hour in each business day (260 hours per year of peak usage and 8506 hours of non-peak usage), then the average cost per minute would be 2.1 cents for the 8.9 percent of the traffic that occurs during the 260 peak hours each year and the average

3 Rolla E. Park, Incremental Costs and Efficient Prices with Lumpy Capacity: The Two Product Case, (Santa Monica, CA: The Rand Corporation, 1994), p. 5.

cost per minute would be zero for the 91.1 percent of the traffic that occurs during the 8506 non-peak hours.

A variety of other engineering studies have been done for specific regulatory purposes and submitted to various state regulatory commissions. For example, New England Telephone prepared an engineering study for the Massachusetts PUC that found an incremental cost of 0.2 cents per minute for local usage served by electronic switches, the same as the Incremental Cost Task Force conclusion using California data.[4]

III. Econometric Estimate

Many econometric cost studies of telecommunication have been done, but the procedures used in most of them do not allow an estimate of the incremental cost of local service. One good econometric cost study that does provide an estimate of the marginal cost of local exchange service is the one performed in 1989 by Louis Perl and Jonathan Falk of NERA, using data from 39 companies (24 Bell and 15 non-Bell) over the years 1984-1987. They developed a statistical relationship between the total cost of the individual companies and the access lines, local usage, and toll usage provided by the companies.

Four different models were used for the statistical estimation. In two of the models, the data for each company

4 Reported in Lewis J. Perl and Jonathan Falk, "The Use of Econometric Analysis in Estimating Marginal Cost," in Pollard, Marginal Cost Techniques, op. cit.

was averaged over the four year period to eliminate the effects of minor year to year fluctuations and to provide a pure cross section estimate. In the other two models, observations were used for each company in each of the four years creating a mixture of time series and cross section observations. In two of the models, calls were used as the unit of usage measurement and in the other two calls minutes were used as the unit of usage measurement.

The estimated marginal costs for local minutes ranged from 0.2 cents per minute to 1.3 cents per minute. The costs per call developed in the models using number of calls as the usage unit were divided by the average holding time to produce estimates of cost per minute comparable to the those from the models using number of minutes as the usage unit. The lowest estimate came from the model with only cross section observations averaged over the four years. The highest estimate came from the model using all observations in a pooled cross section and time series and using calls as the unit of usage measurement. All four models had good statistical properties. Although there are various advantages and disadvantages of each of the four models, none of the four can be identified as either the clearly correct approach or an approach to be discarded.

The statistical form used by Perl and Falk generates marginal cost numbers approximately equal to average cost numbers. Thus it should be expected that their estimates will be somewhat higher than the engineering estimates of